

WE CLAIM:

1. An apparatus for cooling a motor, comprising:  
a motor housing with an upstream side and a downstream side;  
a shaft disposed within the motor housing; an inlet hole in the  
motor housing;  
5 an outlet hole in the motor housing;  
the inlet hole arranged in the same radial plane as the outlet hole;  
and  
an air guide plate;  
the air guide plate formed to channel air from the inlet hole, over  
10 an outer surface of the shaft, and radially outward through the outlet hole.
2. The apparatus of claim 1, further comprising an impeller and a  
bearing housing on the downstream side of the impeller.
3. The apparatus of claim 2, further comprising a bearing seal on the  
downstream side of the bearing housing.
4. An apparatus for cooling a motor, comprising:  
a motor housing with an upstream side and a downstream side;  
a shaft;  
an inlet hole in the motor housing;  
5 an outlet hole in the motor housing;  
a rotor mounted on the shaft;  
the inlet hole arranged in the same radial plane as the outlet hole;  
and  
an air guide plate;  
10 the air guide plate formed to channel air from the inlet hole, over  
an outer surface of the shaft, and into the rotor.

5. The apparatus of claim 4, wherein the rotor comprises a plurality of rotor fins.

6. The apparatus of claim 4, wherein the rotor directs air radially outward through the outlet hole.

7. The apparatus of claim 4, wherein the radial plane is perpendicular to the axis of the motor housing.

8. An apparatus for cooling a motor, comprising:  
a motor housing with an axis, an upstream side, and a downstream side;

5 a shaft having a cylindrical outer surface;  
a bearing housing supporting the shaft;  
a bearing seal on the downstream side of the bearing housing;  
a plurality of through inlet holes formed in the motor housing;  
each of the plurality of through inlet holes arranged in the same radial plane;  
10 a rotor mounted on the shaft; and  
a plurality of air guide plates;  
each of the air guide plates formed to channel air from each of the plurality of through inlet holes, adjacent the bearing seal, over the outer cylindrical surface of the shaft, and into the rotor.

9. The apparatus of claim 8, wherein the radial plane is perpendicular to the axis of the motor housing.

10. The apparatus of claim 8, wherein the rotor comprises a plurality of rotor fins.

11. The apparatus of claim 10, wherein the rotor comprises a centrifugal blower to accelerate air in a radially outward direction.
12. The apparatus of claim 8, further comprising a plurality of through outlet holes, arranged in the same radial plane as the through inlet holes.
13. An apparatus for cooling a motor, comprising:  
a motor housing with an upstream side and a downstream side;  
a shaft having a cylindrical outer surface;  
an impeller mounted on the shaft;  
5 a plurality of rotor fins projecting radially outward from the cylindrical outer surface of the shaft;  
a plurality of through inlet holes formed in the motor housing;  
a plurality of through outlet holes formed in the motor housing;  
each of the plurality of through outlet holes arranged in the same  
10 radial plane; and  
a plurality of air guide plates;  
each of the air guide plates formed to channel air radially inward from a through inlet hole, over the outer cylindrical surface of the shaft, into the plurality of rotor fins, and radially outward through a through outlet hole.
14. The apparatus of claim 13, wherein each of the plurality of through inlet holes are arranged in the same radial plane.
15. The apparatus of claim 14, wherein the plurality of through inlet holes are arranged in the same radial plane as the plurality of through outlet holes.
16. The apparatus of claim 13, wherein the shaft comprises aluminum.

17. The apparatus of claim 13, wherein the impeller comprises aluminum.

18. A motor, comprising:  
a die cast aluminum motor housing with an upstream side and a downstream side;  
an impeller on an aluminum shaft; the shaft coaxial with the motor  
5 housing;  
the shaft having a cylindrical outer surface;  
a bearing housing on the downstream side of the impeller;  
a bearing seal on the downstream side of the bearing housing;  
a plurality of rotor fins projecting radially outward from the  
10 cylindrical outer surface of the shaft;  
a plurality of through inlet holes formed in the motor housing;  
the plurality of through inlet holes arranged in the same radial plane;  
a plurality of through outlet holes formed in the motor housing;  
15 each of the plurality of through outlet holes arranged in the same radial plane;  
each of the plurality of through inlet holes arranged in the same radial plane as each of the plurality of through outlet holes; and  
a plurality of air guide plates;  
20 each of the air guide plates formed to channel air from each through inlet hole, over the cylindrical outer surface of the shaft, and into the plurality of rotor fins.

19. The motor of claim 18, wherein each through outlet hole is located in between two through inlet holes.

20. The motor of claim 18, wherein each air guide plate is formed such that air from each through inlet hole flows adjacent to the downstream side of the bearing seal.

21. A method for cooling a motor, comprising:  
providing a motor housing;  
providing a through inlet hole in the motor housing;  
providing a through outlet hole in the motor housing; and  
5 directing air radially inward through the through inlet hole, into the motor housing, and radially outward through the through outlet hole;  
wherein the through inlet hole and the through outlet hole are in the same radial plane.  
wherein the radial plane is perpendicular to the axis of the motor  
10 housing.

22. The method of claim 21, further comprising providing a rotor on a shaft.

23. The method of claim 22, wherein the rotor accelerates air radially outward through the through outlet hole.

24. The method of claim 21, wherein air is directed radially inward through a plurality of through inlet holes in the motor housing.

25. The method of claim 24, wherein air is directed radially outward through a plurality of through outlet holes in the motor housing.

26. The method of claim 23, wherein air is directed over the surface of the shaft before accelerating air radially outward through the through outlet hole.